



ecology and environment, inc.

CLOVERLEAF BUILDING 3, 6405 METCALF, OVERLAND PARK, KANSAS 66202

International Specialists in the Environment

Site:	Linwood Mining
ID #:	180980852297
Break:	Jo.3
Other:	E+E
TEL:	913/432-9961 4-10-90

MEMORANDUM

RECEIVED
APR 10 1990
PREP SECTION

TO: Pete Culver, RPO
THRU: Philip Dula, FITOM
FROM: E & E/FIT
DATE: April 10, 1990

SUBJECT: Recommendations for the Follow-up Sampling event at the
Linwood Quarry site (formerly Umthun Trucking), Buffalo, IA.
TDD #F-07-8809-008 PAN #FIA0236SB
Site #V86 Project #001
Superfund Contact: Pete Culver
FIT Project Manager: Wesley McCall

The Linwood Quarry limestone mine is located in Buffalo, Iowa, approximately five miles southeast of Davenport on the Mississippi River. This follow-up sampling effort was reported to further define any possible threat to the local ground water posed by site conditions. The FIT observed some evidence of minimal ground water seepage into the mine. The ash was damp below the dry surface layer and wet muddy areas were encountered on the mine chamber floor. The FIT also observed ash from the mine chamber being dumped into the edge of the on-site quarry pond. The Iowa Department of Natural Resources (IDNR) had previously expressed concern about conditions at the quarry pond and its possible effect on the local ground water.

Two factors suggest that there is a low probability contaminants that may leach from the ash in the mine chamber will contaminate area ground water: Analyses showed that samples collected from the mine chamber were not E.P. Toxic; and the permeability of the mine formations is low. However, there is a greater threat for ground water flux contamination via the ash that is being dumped into the quarry pond. Ground water flow into and out of this pond may constitute a pathway for contaminants to enter the local ground water.

The greatest concern identified during the FIT follow-up work at the Linwood Quarry may be worker exposure. Monitoring of the ambient air in the vent of the mine chamber where cleanup operations were under way, disclosed very high levels of airborne particulates. Analyses of the ash samples from the chamber found elevated concentrations of mercury and thallium which are relatively volatile, as well as vanadium, and nickel. Mercury and thallium are not only taken into the body

30815332



Superfund

Linwood Quarry (formerly Umthun Trucking) Follow-up Sampling
Recommendations
Page 2

by inhalation and ingestion but may also be absorbed through the skin. These toxic and potentially hazardous metals also accumulate in the body. The workers in the mine chamber were using only simple dust masks for respiratory protection. This level of protection may not be adequate for the degree of exposure they are receiving.

The ash removal and mine chamber cleanup are conducted every three to five years and these operations take two to four weeks to complete. Therefore, workers are not subjected to continuous daily exposure; the situation appears to be a significant exposure problem of short duration. The FIT recommends that the Iowa Department of Health and/or the Mine Safety and Health Administration (MSHA) be advised of site operations. One of these regulatory agencies may need to further consider this cleanup procedure and worker exposure based on the current analytical results.

The mine chamber vents to the atmosphere at ground level. There are no residences adjacent to the vent area but homes are present at potential downwind locations. IDNR is establishing an air monitoring station near the chamber vent. It would be reasonable for IDNR to consider the current analyses when designing this air sampling program.

The FIT recommends that no further Superfund remedial action be planned at this site (NFRAP). However, IDNR and MSHA may wish to consider the chemical data collected during this project to assist in planning further sampling events, or for apprising worker safety issues.



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International Specialists in the Environment

RECEIVED

APR 10 1990

PREP SECTION

MEMORANDUM

TO: Pete Culver, RPO

THRU: Philip Dula, FITOM

FROM: E & E/FIT

DATE: April 10, 1990

SUBJECT: Data Summary for the Follow-up Sampling event at the
Linwood Quarry site, formerly Umthun Trucking.
TDD #F-07-8809-008 PAN #FIA0236SB
Site #V86 Project #001
Superfund Contact: Pete Culver
FIT Project Manager: Wesley McCall

INTRODUCTION

The Ecology and Environment, Inc. Field Investigation Team (E & E/FIT) was tasked by the Region VII U.S. Environmental Protection Agency (EPA) to conduct follow-up sampling at the Linwood Quarry in Buffalo, Iowa. This limestone mine is located approximately five miles southeast of Davenport (Figure 1). The legal description for the property is the North 1/4 Section 24 and Section 13 of Range 2 East, Township 17 North.

A Screening Site Inspection (SSI) was previously conducted and discussed in an EPA report (E & E/FIT 1989a). The purpose of this follow-up sampling event was to collect samples of the kiln ash being vented into the abandoned underground mine chamber and conduct observation of site operations in an attempt to determine the potential for ground water contamination. Two kiln ash samples were collected, and ambient air monitoring was conducted in the mine chamber. The sample series for this activity was DSX04. A complete EPA Data Transmittal was received on March 14, 1990.

FIELD ACTIVITIES

Monitoring in the mine chamber revealed very high levels of particulates in the ambient air. The HNu photo-ionization detector also gave high readings in the mine chamber, but the high ambient temperature and humidity may have interfered with instrument operation. The FIT also observed ash being dumped into the quarry pond pit. A simple test of mixing ash in deionized water produced an elevated pH of 11.0 (E & E/FIT 1989b).

Following on-site observations and monitoring, the FIT contacted the EPA RPO concerning possible hazards to worker health and other site specific conditions. Morris Preston, Iowa Department of Natural Resources (IDNR) was subsequently notified regarding disposal of ash in the on-site discharge pond. Sahshi Patel, Iowa State Department of Labor, was also contacted about working conditions in the mine chamber.

The two kiln ash samples were collected on November 30, 1989, by FIT members Wesley McCall (team leader) and Ladd Hastings (safety officer). A brief interview with Gaillard Krewer (Vice President of Operations) and Bob Niemala (Mine Manager) revealed that the temperature in the mine chamber was as high as 160° F and that progress on removal and relocation of the kiln ash was proceeding slowly at that time. The FIT conducted a brief reconnaissance of the mine chamber area which had been cleared by the equipment operators. The reconnaissance was conducted using the Rad-mini, Mini-Ram, and HNu monitoring equipment while in level-C personal protection. After the initial safety recon, one sample of ash was collected from the material being dumped into the edge of the quarry pond (001). A second sample was collected inside the mine chamber near the end of the drift being cleared by the equipment (002) (Figure 2). These samples were submitted for total metals, sulfide, E.P. Toxicity, and semi-volatile analyses.

ANALYTICAL RESULTS

Table 1 summarizes the most significant results, and the complete data transmittal is attached. The samples submitted were very fine ash/powder from the flue gases and dust precipitated in the mine chamber from the lime kilns. The sulfide results were reported as undetected. This suggests that essentially all of the sulfur dioxide generated in coal fired kilns remains in the gaseous phase and is vented to the outer atmosphere through the opening of the ground surface. Analysis for E.P. Toxicity also resulted in extracted concentrations of the metals of concern at levels at least one order of magnitude below action levels. Semi-volatiles analysis disclosed the presence of naphthalene (140J µg/kg) and 2-methylnaphthalene (230J µg/kg) in sample 001. Several tentatively identified hydrocarbons, including alkanes and alkenes were detected at concentrations up to three milligrams per kilogram (mg/kg).

The greatest concern is the levels of total metals (Table 1). The metals mercury (Hg), nickel (Ni), thallium (Tl), and vanadium (V) occur at elevated levels in the kiln dust samples collected from the mine chamber. Nickel was detected at three times the background soil sample concentration (044 - sample series DC943 collected during the SSI), and mercury was reported at three times the detection limit reported for background. Both mercury and nickel levels are greater than five times the mean of levels typically observed in soils (Connor and Shacklette 1975). The metals thallium and vanadium occur at approximately ten times the background concentration. In a brief literature review no information concerning the concentration of thallium considered to be typical in soils was found. Information obtained did reveal that the concentration of thallium (0.7 ppm) in the earth's crust is only slightly greater than that of mercury (0.5 ppm) (Merck 1976). Vanadium

occurred at seven times the average level encountered in B-horizon soils (Connor and Shacklette 1975).

Also listed in Table 1 are the ranges of concentration of the metals observed in the soil study (Connor & Shacklette 1975). The mercury, nickel, and vanadium concentrations observed in the ash samples (001 and 002) are greater than the soil range. No data was given for thallium. Coal fly ash generally contains higher concentrations of heavy metals than soils. The concentrations of heavy metals observed in the ash samples from the Linwood site, are similar to those in the National Bureau of Standards (NBS) 1633a Fly Ash standard (Glascock 1988)(see also E & E/FIT 1989c).

The elements arsenic, barium, chromium, and copper were not found to occur at elevated concentrations in the two samples collected from the mine chamber. Conversely, the concentration of calcium is greatly elevated in the samples. The background soil contained 0.34 percent calcium, and samples 001 and 002 contained 24 and 22 percent calcium, respectively.

DISCUSSION OF ANALYTICAL RESULTS

The results of the two samples collected are summarized in Table 1, as are the results from ash samples collected during the Screening Site Inspection of the Linwood Quarry (formerly Umthun Trucking). The average of four samples of ash collected from surface dumped material near the Umthun Trucking terminal is listed together with the results for two samples collected near the baghouse at the kiln. Comparing these results reveals a lower concentration of calcium but higher concentrations of mercury, nickel, lead, thallium, and vanadium in the samples from the mine chamber. This appears to indicate that a lower proportion of lime (CaO) and a higher proportion of the coal ash and soot, containing the heavy metals, is being vented into the mine chamber.

Another factor potentially influencing the higher concentrations of mercury and thallium are their relatively high volatility. Mercury is slightly volatile at room temperature (Merck 1976) and thallium begins to volatilize at 174° C (ITII 1979; Merck 1976) and has a melting point of 303.5° C (Merck 1976). The flue gases from the kilns have temperatures up to 600° F, which is equivalent to 315° C. Thallium will oxidize at room temperature, and thallium oxide is water soluble (Merck 1976).

Thallium is an extremely toxic and cumulative poison, and was used as a rodenticide and insecticide (Sittig 1985; Sax 1989). The manufacture and distribution of these products has been banned (Sittig 1985). The greatest hazard posed by thallium is due to its a cumulation in the liver, brain, and skeletal muscle (Sax 1989). Routes of entry into the body include ingestion, inhalation, and eye and skin contact (Sittig 1985). Mercury is also a poison by inhalation, ingestion, and skin contact (Merck 1976; Sax 1989). Vanadium compounds exhibit variable toxicity, and vanadium pentoxide is included on the EPA Extremely Hazardous Substance List (Sax 1989). Vanadium pentoxide dust is a

poison by inhalation and ingestion (Sax 1989). Many nickel compounds are poisonous and carcinogenic, some are carcinogenic by inhalation (Sax 1989). The time-weighted average for these metals based on an eight-hour workday and 40-hour workweek are listed in Table 1 (ACGIH 1988).

SUMMARY AND CONCLUSIONS

Two additional kiln ash samples were collected from Linwood Quarry and submitted to the EPA Region VII laboratory for total metals, E.P. Toxicity, and semi-volatiles analyses. These samples comprised the ash and dust being vented to the mine chamber from the lime kilns operated on site. Monitoring with the Mini-Ram particle counter during the follow-up sampling indicated that the level of airborne particulates was high in the chamber where employees were working (E & E/FIT 1989b).

The total metals analysis of the ash samples from the mine chamber disclosed elevated levels of several metals; mercury, thallium, nickel, and vanadium. The range of concentrations ranged to as much as ten times background soil levels (thallium and vanadium). Neither of the samples collected were found to be E.P. Toxic, and sulfide was not observed above the detection limit. Two semi-volatile compounds, naphthalene and 2-methylnaphthalene, were detected in one of the ash samples. These are ubiquitous polycyclic aromatic hydrocarbons (PAHs) found at low concentrations in the ash.

Because of the elevated concentrations of heavy metals in the ash, and the high particulate readings in the mine chamber, the health and safety of the workers may need closer consideration when conducting cleanup operations in the future. This mine cleanup is conducted every three to five years and requires two to four weeks to complete.

A concern is the potential daily exposure to local residents and workers. The flue gases and particulates not precipitated in the mine chamber are vented to the atmosphere at ground level. Because of the volatile nature of mercury and thallium (as well as the elevated concentrations of nickel and vanadium in the particulates) and their hazardous characteristics, the air quality may be threatened at this locality.

The fact that slightly higher concentrations of heavy metals in the ash from the mine chamber were detected than in previous samples also suggests an increased threat to the local ground water. During the follow-up sampling the FIT observed seepage of ground water into the mine chamber. The FIT also noted that the ash being removed from the mine was being dumped into the edge of the discharge pond that occupies the abandoned quarry works. During the Screening Site Inspection conducted by the FIT in May 1989, the pH of the water in the quarry pond was tested and found to be 9.8. A simple pH test conducted on the lime rich ash (E & E/FIT 1989b) suggests that dumping this material into the quarry pond could further exacerbate the existing problem.

Attachments: Bibliography

Figure 1: Site Location Map

Figure 2: Site Map with Sample Locations

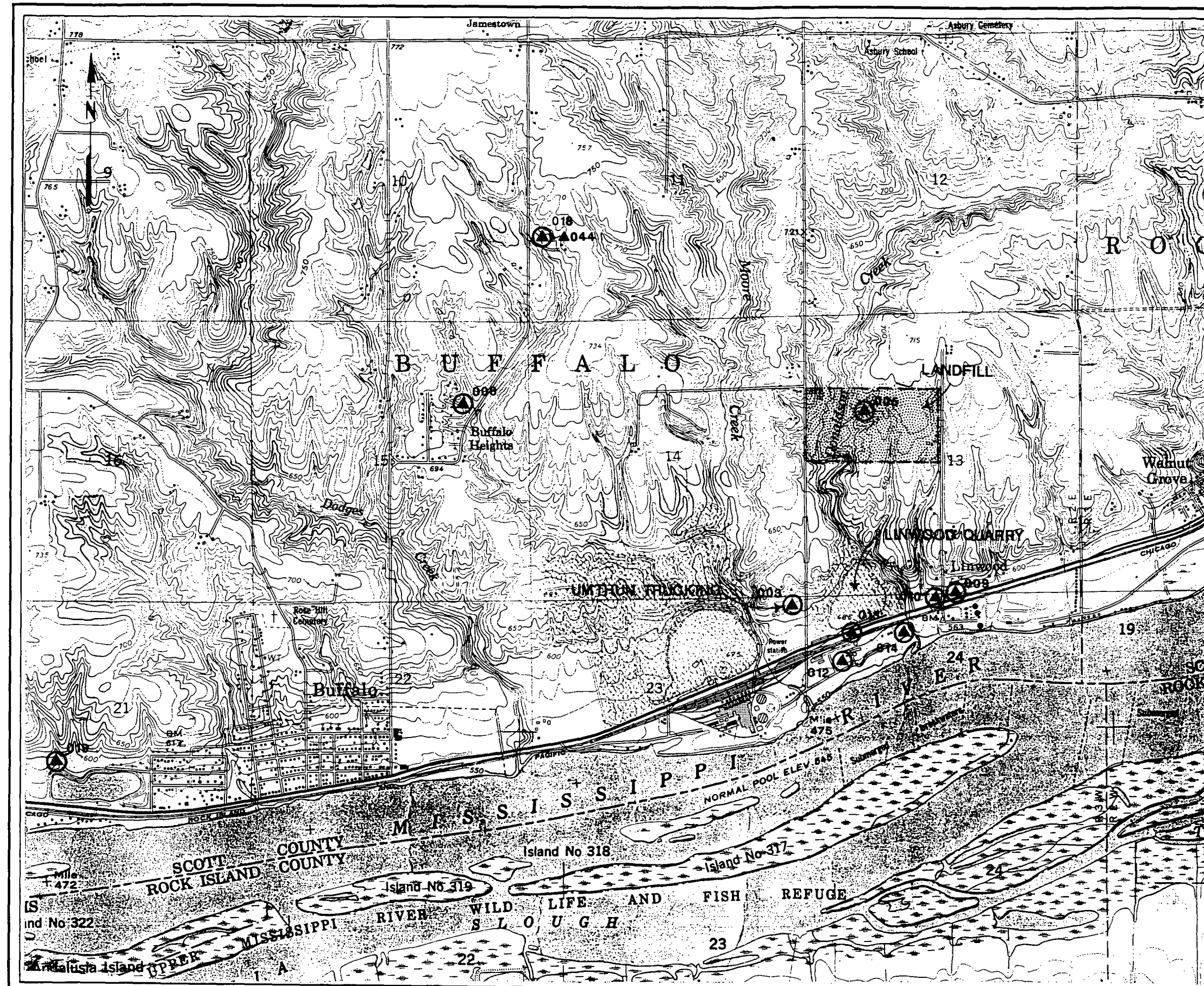
Table 1: Selected Metals in Kiln Ash

Linwood Quarry (formerly Umthun Trucking)
Data Summary for Follow-up Sampling
Page 5

Chain-of-Custody Record
EPA (DSX04) Data Transmittal (with Field Sheets)
Selected data for Sample Series #DC943



BIBLIOGRAPHY

- American Conference of Governmental Industrial Hygienists, 1988, Threshold Limit Values and Biological Exposure Indices for 1988-1989, Cincinnati, Ohio.
- Ecology and Environment, Inc., Field Investigation Team, 1989a, Data Summary for the Screening Site Inspection of the Umthun Trucking/Linwood Quarry Site, Buffalo, Iowa, May 1989, TDD# F-07-8809-008.
- Ecology and Environment, Inc., Field Investigation Team, 1989b, Trip Report for the Follow-up Sampling at the Linwood Quarry Site, Buffalo, Iowa, TDD# F-07-8809-008.
- Ecology and Environment, Inc., Field Investigation Team, 1989c, Work Plan for the Screening Site Inspection at the Umthun Trucking/Linwood Quarry Site, Buffalo, Iowa, May 1989, TDD #F-07-8809-008.
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- The International Technical Information Institute, 1979, Toxic and Hazardous Industrial Chemicals Safety Manual, Tokyo, Japan.
- Krewer, Gaillard, November 21, 1989, Vice President of Operations, Linwood Quarry, Buffalo, Iowa, personal communications with Wes McCall, E & E/FIT.
- Sax, N. Irving and Richard J. Lewis, 1989, Dangerous Properties of Industrial Materials, New York, NY.
- Sittig, Marshall, 1985, Handbook of Toxic and Hazardous Chemicals and Carcinogens, Park Ridge, New Jersey.
- Windholz, Martha, et al, 1976, The Merck Index, An Encyclopedia of Chemicals and Drugs, Rahway, New Jersey.

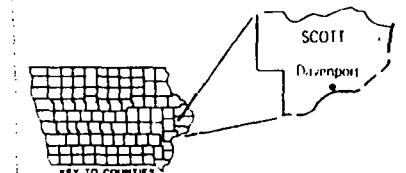


UMTHUN TRUCKING / LINWOOD QUARRY SITE

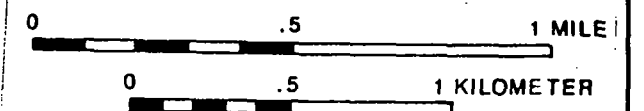
BUFFALO, IOWA

WELL SAMPLE LOCATIONS 
SOIL SAMPLE LOCATION 

MAP LOCATION



SCALE 1:24000

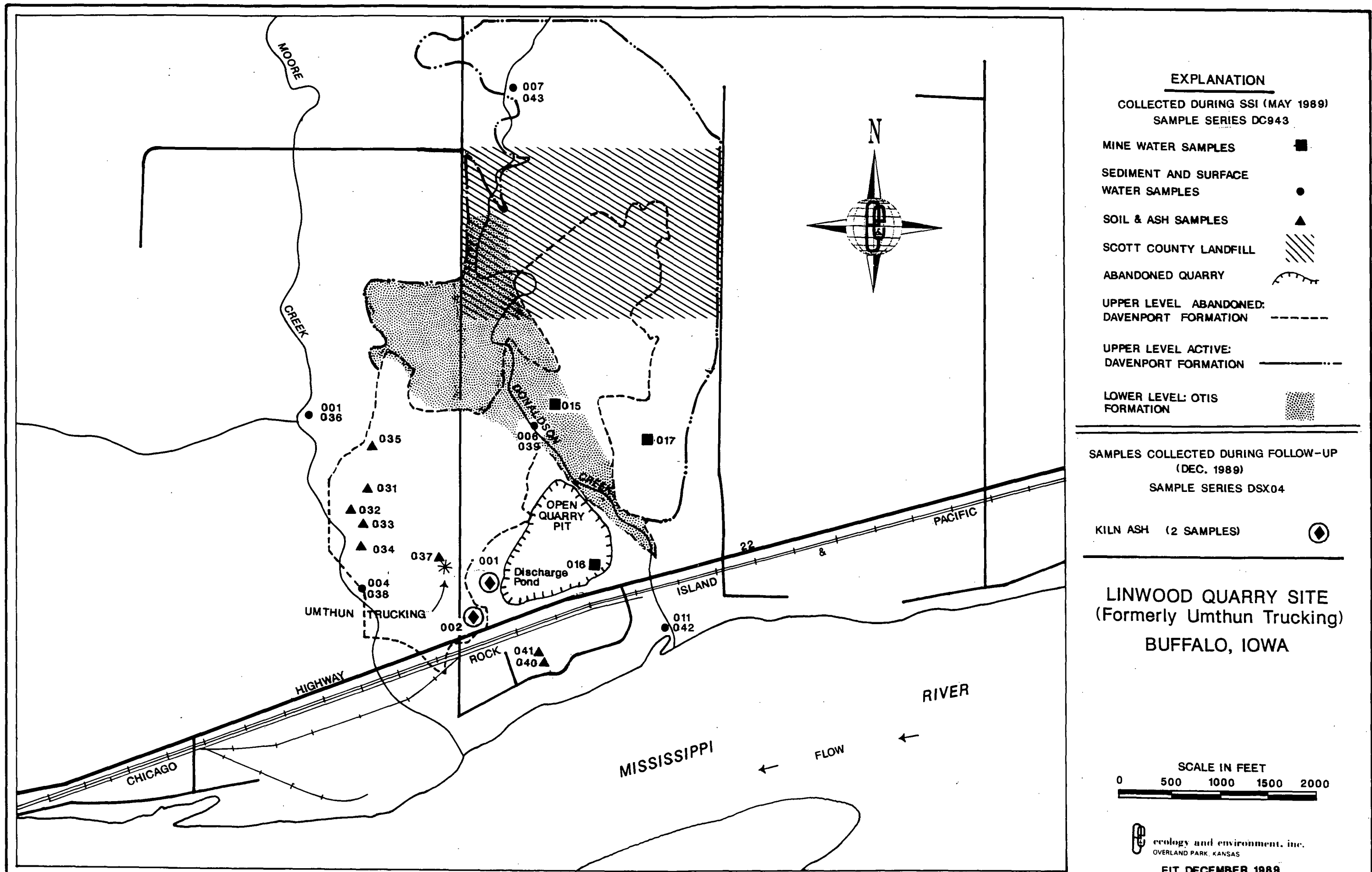


 ecology and environment, inc.
OVERLAND PARK, KANSAS

WASTE SITE TRACKING NO.: IA0236
PREPARED BY: LEE ROBERTSON

FIGURE 1: SITE LOCATION

FIT 1989
SOURCE: USGS ANDALUSIA, IA 1970 QUAD



WASTE SITE TRACKING NO.: IA0236
PREPARED BY: LEE ROBERTSON

FIGURE 2: SITE MAP WITH SAMPLE LOCATIONS

Table 1
Selected Metals in Kiln Ash
Linwood Quarry/Umthun Trucking
Buffalo, Iowa
E & E/FIT, November and May 1989
Sample Activity #DSX04 and DC943

Sample #	Ca%	Hg	Ni	Pb	Tl	V
Sample Series DSX04						
001	24%	0.38	120	32	1.8J	460
002	22%	0.41	110	23	2.7J	430
Sample Series DS943						
Old Ash	30%	0.13U	13.8	8.4	0.27J	24U
040	31%	0.10U	77	13	0.18	210
041	39%	0.10U	66	8.1	2.0U	190
044	0.34%	0.12U	23	24	0.22J	27U
Background Soil (Connor and Shacklette 1975)						
Range	<0.01-8.6	0.01-0.26	<3-70	<10-200	N/A	<5-260
Average	0.39%	0.072	17.7	19.6	N/A	64.4
TWA*	2.0	0.05	1.0	0.15	0.1	N/A

Old Ash = average of 031 through 034D

040 & 041 = fresh ash at baghouse

044 = background soil

N/A = not available

* Time-Weighted Average (TWA) concentration for a normal 8-hour workday and 40-hour workweek (ACGIH 1988); units are milligrams per cubic meter in air.

Notes: Units are milligrams/kilogram (mg/kg) except where noted as percent. Only detected concentrations are reported. See Figure 2 for sample locations and the attached data transmittals for complete analytical results.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
25 FUNSTON ROAD
KANSAS CITY, KANSAS 66115

MAR 13 1990

DATE: _____

MEMORANDUM

SUBJECT: Data Transmittal for Activity #: DSX04,
Site Description: Linwood Quarry

FROM: Andrea Jirka *[initials]*
Chief, Laboratory Branch, ENSV

TO: Robert Morby
Chief, Superfund Branch, WSTM

ATTN: Pete Culver

Attached is the data transmittal for the above referenced site. These data have met all quality assurance requirements unless indicated otherwise in a data package. This should be considered a ___ Partial or ☒ Complete data transmittal (completes transmittal of _____). If you have any questions or comments, please contact Dee Simmons at 236-3881.

Attachments

cc: Data Files
Ann Melia, E&E/FIT

RECEIVED
MAR 14 1990
E & E K. C. K.

DATA REPORTING / QUALIFICATION CODES

- U - The material was analyzed for, but was not detected. The associated numerical value is the sample detection limit.
- J - The associated numerical value is an estimated quantity (explanation attached).
- I - The data are invalid (compound may or may not be present). Resampling and/or reanalysis is necessary for verification.
- N - Sample not analyzed.

CODES FOR FLASH POINT DATA

- L - The sample did not ignite or "flash". This is the highest temperature at which the sample was tested. It is possible that the material may be ignitable at higher temperatures.
- K - The sample did ignite or "flash" at the lowest temperature tested. This is usually the ambient temperature at the time of the test. It is possible that the material may be ignitable at even lower temperatures.

ANALYSIS TYPE: METALS, TOTAL

TITLE: LINWOOD QUARRY
LAB: SILVER VALLEY
SAMPLE PREP: _____
REVIEW LEVEL: 2

MATRIX: SEDIMENT
METHOD: CS0788A
ANALYST/ENTRY: PLC REVIEWER: P. Cox
DATA FILE : P29

UNITS: MG/KG
CASE: 13396
DATE: 01/18/90

SAMPLES	DSX04001	DSX04002
ALUMINUM	8400	5800
ANTIMONY	20 U	17 U
ARSENIC	7.9	7.4
BARIUM	76	66
BERYLLIUM	0.69 J	1.5 U
CADMIUM	1.6 U	1.5 U
CALCIUM	240000	220000
CHROMIUM	14 J	8.7 J
COBALT	4.5 J	2.1 J
COPPER	20	17
IRON	9200 J	7800 J
LEAD	32	23
MAGNESIUM	12000	20000
MANGANESE	290 J	290 J
MERCURY	0.38	0.41
NICKEL	120	110
POTASSIUM	3000	3600
SELENIUM	1.6 U	1.2 J
SILVER	3.3 U	2.9 U
SODIUM	1300 J	1400 J
THALLIUM	1.8 J	2.7 J
VANADIUM	460	430
ZINC	35 J	17 J
CYANIDE	N	N

ANALYSIS TYPE: EP TOXICITY

TITLE: Linwood Quarry
LAB: Rocky Mtn. Anal.
SAMPLE PREP: _____
REVIEW LEVEL: 2

MATRIX: WATER
METHOD: C0788EM
ANALYST/ENTRY: DEW
REVIEWER: SW
DATA FILE : M96

UNITS: UG/L
CASE: 5051G
DATE: 02/07/90

SAMPLES	DSX04001	DSX04002
ARSENIC	4.7 J	3.4 J
BARIUM	180 J	240 J
CADMIUM	15 U	15 U
CHROMIUM	25 U	25 U
LEAD	50 U	50 U
MERCURY	0.20 U	0.20 U
SELENIUM	12 J	50 U
SILVER	25 U	25 U

5 mg/L ppm

↑
100
for EP Tox
ppm

No 2nd time results reported

ANALYSIS TYPE: SULFIDE

TITLE: LINWOOD QUARRY

LAB: ENSECO/RMAL

SAMPLE PREP: _____

REVIEW LEVEL: 2

ANALYST/ENTRY: PLC

MATRIX: FLY ASH

METHOD: C9030SA

REVIEWER: p.cox

DATA FILE : P52

UNITS: MG/KG

CASE: 5150G

DATE: 02/09/90

SAMPLE NO.

RESULT

DSX04001

.5

U

DSX04002

.5

U

ANALYSIS TYPE: SEMIVOLATILES--PAGE 1

TITLE: LINWOOD QUARRY

LAB: EIRA

SAMPLE PREP: _____

ANALYST/ENTRY: PLC

REVIEW LEVEL: 2

MATRIX: SEDIMENT

METHOD: CS0288A

REVIEWER: D. COX

DATA FILE : P31

UNITS: UG/KG

CASE: 13396

DATE: 01/30/90

SAMPLES	DSX04001	DSX04002
PHENOL	530 U	480 U
BIS(2-CHLOROETHYL) ETHER	530 U	480 U
2-CHLOROPHENOL	530 U	480 U
1,3 DICHLOROBENZENE	530 U	480 U
1,4 DICHLOROBENZENE	530 U	480 U
BENZYL ALCOHOL	530 U	480 U
1,2 DICHLOROBENZENE	530 U	480 U
2-METHYLPHENOL	530 U	480 U
BIS(2-CHLOROISOPROPYL) ETHER	530 U	480 U
4-METHYLPHENOL	530 U	480 U
N-NITROSO-DIPROPYLAMINE	530 U	480 U
HEXACHLOROETHANE	530 U	480 U
NITROBENZENE	530 U	480 U
ISOPHORONE	530 U	480 U
2-NITROPHENOL	530 U	480 U
2,4-DIMETHYLPHENOL	530 U	480 U
BENZOIC ACID	2600 U	2300 U
BIS(2-CHLOROETHOXY) METHANE	530 U	480 U
2,4 DICHLOROPHENOL	530 U	480 U
1,2,4-TRICHLOROBENZENE	530 U	480 U
NAPHTHALENE	140 J	480 U
4-CHLOROANILINE	530 U	480 U
HEXACHLOROBUTADIENE	530 U	480 U
4-CHLORO-3-METHYLPHENOL	530 U	480 U
2-METHYLNAPHTHALENE	230 J	480 U
HEXACHLOROCYCLOPENTADIENE	530 U	480 U
2,4,6-TRICHLOROPHENOL	530 U	480 U
2,4,5-TRICHLOROPHENOL	2600 U	2300 U
2-CHLORONAPHTHALENE	530 U	480 U
2-NITROANILINE	2600 U	2300 U
DIMETHYLPHTHALATE	530 U	480 U
ACENAPHTHYLENE	530 U	480 U
3-NITROANILINE	2600 U	2300 U
ACENAPHTHENE	530 U	480 U
2,4-DINITROPHENOL	2600 U	2300 U
4-NITROPHENOL	2600 U	2300 U
DIBENZOFURAN	530 U	480 U
2,4-DINITROTOLUENE	530 U	480 U

ANALYSIS TYPE: SEMIVOLATILES--PAGE 2

TITLE: LINWOOD QUARRY

LAB: EIRA

SAMPLE PREP: _____

REVIEW LEVEL: 2

MATRIX: SEDIMENT

METHOD: CS0288A

ANALYST/ENTRY: PLC REVIEWER: P. COX

DATA FILE : P32

UNITS: UG/KG

CASE: 13396

DATE: 01/30/90

SAMPLES	DSX04001	DSX04002
2,6-DINITROTOLUENE	530 U	480 U
DIETHYLPHTHALATE	530 U	480 U
4-CHLOROPHENYL PHENYL ETHER	530 U	480 U
FLUORENE	530 U	480 U
4-NITROANILINE	2600 U	2300 U
4,6-DINITRO-2-METHYLPHENOL	2600 U	2300 U
N-NITROSODIPHENYLAMINE	530 U	480 U
4-BROMOPHENYL PHENYL ETHER	530 U	480 U
HEXACHLOROBENZENE	530 U	480 U
PENTACHLOROPHENOL	2600 U	2300 U
PHENANTHRENE	530 U	480 U
ANTHRACENE	530 U	480 U
DI-N-BUTYLPHTHALATE	530 U	480 U
FLUORANTHENE	530 U	480 U
PYRENE	530 U	480 U
BUTYL BENZYL PHTHALATE	530 U	480 U
3,3' DICHLOROBENZIDINE	1100 U	960 U
BENZO(A)ANTHRACENE	530 U	480 U
BIS(2-ETHYLHEXYL) PHTHALATE	530 U	480 U
CHRYSENE	530 U	480 U
DI-N-OCTYL PHTHALATE	530 U	480 U
BENZO(B)FLUORANTHENE	530 U	480 U
BENZO(K)FLUORANTHENE	530 U	480 U
BENZO(A)PYRENE	530 U	480 U
INDENO(1,2,3-CD)PYRENE	530 U	480 U
DIBENZO(A,H)ANTHRACENE	530 U	480 U
BENZO(G,H,I)PERYLENE	530 U	480 U

TENTATIVELY IDENTIFIED COMPOUNDS

TITLE: LINWOOD QUARRY
LAB: EIRA
ANALYST/ENTRY: PLC
REVIEW LEVEL: 2

MATRIX: SEDIMENT
METHOD: CS0288A
REVIEWER: P. COX
DATA FILE : P33

UNITS: UG/KG
CASE: 13396
DATE: 01/30/90

SAMPLE NO.	COMPOUND NAME	FRACTION	EST. CONCENTRATION
DSX04001			
	C9H12 ISOMER	BNA	600 J
	C10H14 ISOMER	BNA	600 J
	16 UNKNOWN ALKANES	BNA	400-3000 J
	UNKNOWN ALKENE	BNA	400 J
	UNKNOWN	BNA	500 J
DSX04002			
	UNKNOWN ALKANE	BNA	500 J

- * THIS IS A CRUDE ESTIMATION BASED ON RESPONSE RELATIVE TO AN INTERNAL STANDARD. AN AUTHENTIC STANDARD HAS NOT BEEN RUN.
- ** THE COMPOUNDS WERE IDENTIFIED USING A LIBRARY SEARCH ROUTINE. AUTHENTIC STANDARDS HAVE NOT BEEN ANALYZED TO VERIFY COMPOUND MASS SPECTRA AND RETENTION TIMES.

U.S. ENVIRONMENTAL PROTECTION AGENCY

Environmental Services Assistance Team -- Zone II

ICF Technology, Inc.

NSI Technology Services Corp.

The Bionetics Corp.

ESAT Region VII
NSI Technology Services
25 Funston Road
Kansas City, KS 66115
(913) 236-3881

MEMORANDUM

TO: Debra Morey, Chemist, CLQA/LABO/EPA
THRU: Harold Brown, Ph.D, DPO/LABO/EPA

FROM: Peggy Cox, QA/QC Chemist/ESAT/NSI *Re: MA*
THRU: Ronald Ross, Manager/ESAT/NSI

DATE: January 18, 1990

SUBJECT: Review of data for LINWOOD QUARRY
TID#: 07-8909-308
ASSIGNMENT#: 371
ICF ACCT#: 26-308-02
NSI S.O.#: 4633-3082

These data were reviewed according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," July 1, 1988 revision.

The following comments and attached data sheets are a result of NSI Technology Services Corporation's review of the above mentioned data from the contract laboratory.

CASE NO.: 13396
CONTRACT NO.: 68-W8-0074
SITE: LINWOOD QUARRY
REVIEWER: P. COX

LABORATORY: SILVER VALLEY
METHOD NO.: CS0788A
EPA ACTIVITY: DSX04
MATRIX: SOIL

SMO SAMPLE NO.

MGG396
MGG397

EPA SAMPLE NO.

DSX04001
DSX04002

GENERAL

Case 13396 contained 11 soil samples (2 actual; 9 QC) analyzed for total metals at the low level concentration. Arsenic (As), lead (Pb), selenium (Se), and thallium (Tl) were analyzed by graphite furnace atomic absorption (GFAA) spectroscopy and mercury (Hg) by cold vapor. Data review was performed at level 2.

1. TECHNICAL HOLDING TIMES and PRESERVATION

A. No technical holding times or required preservation are specified for soil samples.

2. INITIAL and CONTINUING CALIBRATION

A. Initial and continuing calibrations were within quality control limit requirements.

3. BLANKS

A. No analytes were detected above the contract required detection limit (CRDL) in any blank.

B. Levels of analytes greater than the instrument detection limit (IDL) were detected for aluminum (Al), chromium (Cr), copper (Cu), iron (Fe), lead (Pb), and zinc (Zn). Analytes greater than the instrument detection limit (IDL) but less than 5 times the highest level detected in the blank were qualified with a "U" code.

4. ICP INTERFERENCE CHECK

A. All analytes contained in the ICP interference check sample were within quality control limit requirements except antimony (Sb), potassium (K), and sodium (Na) which were detected but not elements in the AB ICS solution. Antimony (Sb) and potassium (K) were reported at levels less than the instrument detection limits (IDL) and sodium (Na) at levels greater than the instrument detection limit. All positive sodium (Na) results were qualified by the ICP interference check sample with a "J" code.

5. LABORATORY CONTROL SAMPLE

A. All laboratory control samples analyzed met quality control limit requirements.

6. DUPLICATES

A. All analytes were within quality control limit requirements except chromium (Cr). All positive chromium (Cr) results were qualified by the duplicate rules with a "J" code.

7. SPIKES

A. All analytes were within quality control limit requirements for percent recovery except antimony (Sb), silver (Ag), and selenium (Se). Positive analyte results were qualified with a "J" code by the spike recovery rules.

8. GRAPHITE FURNACE ATOMIC ABSORPTION (GFAA) SPECTROSCOPY

A. All quality control limit requirement criteria for graphite furnace atomic absorption (GFAA) spectroscopy were met.

B. Standard addition data for selenium (Se) in sample DSX04002 (MGG397) resulted in a correlation coefficient of less than 0.995. No data was qualified since the analyte concentration was greater than the instrument detection limit (IDL) but less than the contract required detection limit (CRDL).

9. ICP SERIAL DILUTION

A. Iron (Fe), manganese (Mn), and zinc (Zn) were outside quality control limit requirements for percent difference on the ICP serial dilution. Positive results in all samples were qualified with a "J" code by the ICP serial dilution.

10. PERFORMANCE EVALUATION SAMPLE

A. No performance evaluation sample was submitted to the laboratory for analysis associated with this case and SDG number.

11. SUMMARY

A. Blank rules were applied to all samples for aluminum (Al), chromium (Cr), copper (Cu), iron (Fe), lead (Pb), and zinc (Zn). No data were qualified according to the blank rule.

B. Positive sample results for sodium (Na) were qualified with a "J" code due to significant concentrations present in the ICP check sample.

C. All positive sample data for chromium (Cr) were qualified with a "J" code because duplicate sample analyses indicated problems maintaining acceptable precision.

D. All positive sample data for antimony (Sb), silver (Ag), and selenium (Se) were qualified with a "J" code because spike sample analyses indicated unacceptable accuracy.

E. Some analyte data were "J" coded due to the analyte concentration being greater than the instrument detection limit (IDL) but less than the contract required detection limit (CRDL).

F. Positive results for iron (Fe), manganese (Mn), and zinc (Zn) were qualified with a "J" code by the ICP serial dilution rules.

G. This data package generally meets the requirements for precision, accuracy, and completeness as described in SOW CS0788A, with the exceptions noted above.

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology, Inc.

NSI Technology Services Corp.

The Bionetics Corp.

ESAT Region VII

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MEMORANDUM

TO: Debra Morey, Chemist, CLQA/LABO/EPA

THRU: Harold Brown, Ph.D, DPO/LABO/EPA

FROM: Peggy Cox, QA/QC Chemist/ESAT/NSI *RC/AA*

THRU: Ronald Ross, Manager/ESAT/NSI

DATE: January 31, 1990

SUBJECT: Review of data for LINWOOD QUARRY

TID#: 07-8909-308

ASSIGNMENT#: 383

ICF ACCT#: 26-308-02

NSI S.O.#: 4633-3082

These data were reviewed according to the "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses," February 1, 1988 revision and the "Laboratory Data Validation Functional Guidelines for Evaluating Pesticides and PCBs."

The following comments and attached data sheets are a result of NSI Technology Services Corporation's review of the above mentioned data from the contract laboratory.

CASE NO.: 13396

CONTRACT NO.: 68-01-7414

SITE: LINWOOD QUARRY

REVIEWER: P. COX

LABORATORY: EIRA

METHOD NO.: CS0288A

EPA ACTIVITY: DSX04

MATRIX: SOIL

SMO SAMPLE NO.

GJ694

GJ695

EPA SAMPLE NO.

DSX04001

DSX04002

GENERAL

Case 13396 contained 7 soil samples (2 actual; 5 QC) analyzed for base/neutrals and acids at the low level concentration. Data review was performed at level 2.

1. TECHNICAL HOLDING TIMES and PRESERVATION

A. No technical holding times or required preservation are specified for soil samples.

2. GC/MS TUNING

A. All GC/MS tunings and mass calibrations were within quality control limit requirements for decafluorotriphenylphosphine (DFTPP).

3. INITIAL and CONTINUING CALIBRATION

A. N-nitroso-di-n-propylamine, benzoic acid, 2,6-dinitrotoluene, 2,4-dinitrophenol, 4,6-dinitro-2-methylphenol, and pentachlorophenol were outside quality control limit requirements for percent difference (%D) (greater than 25%) on the continuing calibration. Sample results for these compounds were non-detect and resulted in no qualification code being applied except for n-nitroso-di-n-propylamine in quality control samples DSX04001S and DSX04001W which were "J" coded.

4. INTERNAL STANDARD RESPONSE

A. All internal standard response areas were within a factor of 2 when comparing samples and their associated continuing calibration response areas.

5. BLANKS

A. One method blank was analyzed for the base/neutral and acid fractions with no compounds reported.

6. SURROGATE RECOVERY

A. All surrogates were within quality control limit requirements for percent recovery except terphenyl-d14 in sample DSX04002 (GJ695) and 2,4,6-tribromophenol in samples DSX04001 (GJ694), DSX04001S, and DSX04001W. No data were qualified by the surrogate recovery rules.

7. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

A. A matrix spike/matrix spike duplicate was analyzed for base/neutrals and acids and was within quality control limit requirements except percent recovery of 4-nitrophenol and pentachlorophenol in the matrix spike and matrix spike duplicate. Both compounds were reported with 0% recovery due to matrix effects. No data were qualified by the matrix spike/matrix spike duplicate.

8. PERFORMANCE EVALUATION SAMPLE

A. No performance evaluation sample was submitted to the laboratory for analysis associated with this case and SDG number.

9. COMPOUND IDENTIFICATION and QUANTITATION

A. All target compound identifications were supported by good agreement between sample and standard mass spectra submitted for each positive sample response.

10. SUMMARY

A. N-nitroso-di-n-propylamine in quality control samples DSX04001S and DSX04001W were "J" coded due to the continuing calibration exceeding quality control limit criterion for accuracy.

B. Naphthalene and 2-methylnaphthalene were "J" coded in sample DSX04001 (GJ694) due to the compound concentration being greater than the instrument detection limit (IDL) but less than the contract required detection limit (CRDL).

C. This data package generally meets the requirements for precision, accuracy, and completeness as described in SOW for Organic Analysis dated February 1988, with the exceptions noted above.

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology, Inc.

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ESAT Region VII
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25 Funston Road
Kansas City, KS 66115
(913) 236-3881

TO: Debra Morey
Data Review Task Monitor
THRU: Harold Brown, Ph.D.
ESAT Deputy Project Officer, EPA

FROM: D. Eric Woodland *EW*
ESAT Data Reviewer
THRU: Ronald A. Ross
ESAT Team Manager

DATE: February 7, 1990
SUBJECT: Review of inorganic data for Linwood Quarry.

TID# 07-8909-308
ASSIGNMENT# 396
ICF ACCT# 26-308-02
NSI S.O.# 4633-3082

These data were reviewed according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," July 1988 revision and the Region VII Inorganic Data Review Training Manual as guidance.

The following comments and attached data sheets are a result of the ESAT review of the above mentioned data from the contract laboratory.

CASE NO.: 5051G
SITE: Linwood Quarry
REVIEWER: D. Eric Woodland

LABORATORY: Rocky Mt. Anal.
METHOD NO.: C0788EM
EPA ACTIVITY NO.: DSX04
MATRIX: SOIL

EP TOX METALS (SOIL)
SMO Sample No. EPA Sample No.

5051G-1	DSX04001
5051G-2	DSX04002

GENERAL

This data review assignment covers TWO SOIL samples analyzed for 8 EP TOX METALS for case number 5051G. These samples were also analyzed for sulfide, but the data review will be done separately. There were no field blanks, duplicates or performance samples included with this assignment.

10. Summary

One sample result was qualified for Pb by the blank rule. No other sample results were qualified.

These results are for EP TOX metals. The lab analyzed the samples at a five fold dilution because of high Ca levels.

There were 5 results reported between the IDL and CRDL. These results are routinely "J" coded.

This data package is acceptable in terms of requirements for accuracy, precision, and completeness as described in SOP 9561M00.

ENVIRONMENTAL SERVICES ASSISTANCE TEAM -- Zone II

ICF Technology, Inc.

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MEMORANDUM

TO: Debra Morey, Chemist, CLQA/LABO/EPA

THRU: Harold Brown, Ph.D, DP0/LABO/EPA

FROM: Peggy Cox, QA/QC Chemist/ESAT/NSI *Re/AM*

THRU: Ronald Ross, Manager/ESAT/NSI

DATE: February 8, 1990

SUBJECT: Review of data for LINWOOD QUARRY

TID#: 07-8909-308

ASSIGNMENT#: 396B

ICF ACCT#: 26-308-02

NSI S.O.#: 4633-3082

These data were reviewed according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses," July 1, 1988 revision.

The following comments and attached data sheets are a result of NSI Technology Services Corporation's review of the above mentioned data from the contract laboratory.

CASE NO.: SAS 5150G

CONTRACT NO.: V0122

SITE: LINWOOD QUARRY

REVIEWER: P. COX

LABORATORY: ENSECO/RMAL

METHOD NO.: C9030SA

EPA ACTIVITY: DSX04

MATRIX: FLY ASH

SMO SAMPLE NO.

5150G1

5150G2

EPA SAMPLE NO.

DSX04001

DSX04002

GENERAL

Special Analytical Services (SAS) request 5150G contained 6 fly ash samples (2 actual; 4 QC) analyzed for total available sulfide (insoluble). Laboratory did not adhere to the SAS request in that duplicate and matrix spike analyses were performed on only one environmental sample, instead of both, and no laboratory check sample was analyzed. Data review was performed at level 2.

1. TECHNICAL HOLDING TIMES and PRESERVATION

A. No technical holding times or required preservation are specified for fly ash samples.

2. INITIAL and CONTINUING CALIBRATION

A. Initial and continuing calibrations were within quality control limit requirements.

3. BLANKS

A. No sulfide was detected above the contract required detection limit (CRDL) in any blank.

4. LABORATORY CHECK SAMPLE

A. No laboratory check sample associated with this SAS was analyzed for sulfide.

5. DUPLICATES

A. One duplicate analyses was performed and was within quality control limit requirements ($\pm 20\%$).

6. SPIKES

A. One matrix spike analyses was performed and was outside quality control limit requirements for percent recovery (75-125%). Sample was reprepared and reanalyzed but percent recovery was still outside quality control limits. No data were qualified by the matrix spike.

7. PERFORMANCE EVALUATION SAMPLE

A. No performance evaluation sample was submitted to the laboratory for analysis associated with this case and SDG number.

8. SUMMARY

A. This data package generally meets the requirements for precision, accuracy, and completeness as described in SW-846, Method 9030.

Excerpt from

Data Transmittal

for

Sample Series DC943

ANALYSIS TYPE: METALS, TOTAL

TITLE: UMTNUM TRUCKING

LAB: NANCO

SAMPLE PREP: _____

REVIEW LEVEL: 2

MATRIX: SEDIMENT

METHOD: 9001W71

ANALYST/ENTRY: PLC REVIEWER: P. Cox

DATA FILE : P56

UNITS: MG/KG

CASE: 12127

DATE: 07/21/89

SAMPLES	DC943031	DC943032	DC943033	DC943034
ALUMINUM	7300	6600	6600	6500
ANTIMONY	18 U	16 U	16 U	16 U
ARSENIC	5.9 J	5.0 J	4.9 J	5.0 J
BARIUM	53 J	49 J	36 J	52 J
BERYLLIUM	1.8	1.9	2.2	2.1
CADMIUM	0.60 J	0.53 J	0.81 J	1.3 U
CALCIUM	310000 J	320000 J	250000 J	300000 J
CHROMIUM	15	12	12	11
COBALT	6.6 J	4.5 J	4.0 J	3.9 J
COPPER	38 J	4.8 J	2.2 J	3.4 J
IRON	13000	15000	14000	13000
LEAD	12	10	7.4	6.1
MAGNESIUM	2400	2400	1000 J	1300 J
MANGANESE	520 J	590 J	450 J	500 J
MERCURY	0.15 U	0.13 U	0.13 U	0.13 U
NICKEL	13	15	13	14
POTASSIUM	1500 U	1800 U	2200 U	1500 U
SELENIUM	0.69 J	0.75 J	0.65 J	0.62 J
SILVER	6.0	5.1	4.3	5.2
SODIUM	1500 U	1300 U	1300 U	1300 U
THALLIUM	0.30 J	0.37 J	0.24 J	0.23 J
VANADIUM	23 U	22 U	24 U	24 U
ZINC	96	56 U	110	75 U
CYANIDE	N	N	N	N

ANALYSIS TYPE: METALS, TOTAL

TITLE: UMTUM TRUCKING

LAB: NANCO

SAMPLE PREP: _____

REVIEW LEVEL: 2

MATRIX: SEDIMENT

METHOD: 9001W71

REVIEWER: P. Cox

DATA FILE : P56

UNITS: MG/KG

CASE: 12127

DATE: 07/21/89

SAMPLES	DC943034D	DC943035	DC943036	DC943037
ALUMINUM	7700	16000	4000	10000
ANTIMONY	18 J	35 J	35 J	13 J
ARSENIC	5.4 J	9.6 J	4.1 J	5.0 J
BARIUM	57	140	160	110
BERYLLIUM	2.4	1.9	2.9	1.4
CADMIUM	0.48 J	1.2 U	0.87 J	0.45 J
CALCIUM	340000 J	5300 J	5600 J	38000 J
CHROMIUM	12	21	8.7	16
COBALT	4.3 J	11 J	28	6.8 J
COPPER	5.3 J	6.0 U	7.3 U	5.7 U
IRON	15000	23000	37000	15000
LEAD	6.3	18	6.5	14
MAGNESIUM	1400	2800	950 J	2500
MANGANESE	540 J	610 J	2200 J	790 J
MERCURY	0.12 U	0.12 U	0.14 U	0.11 U
NICKEL	14	22	64	16
POTASSIUM	1700 U	2100 U	1500 U	1900 U
SELENIUM	0.60 J	0.41 J	0.23 J	0.41 J
SILVER	5.3	2.4 U	2.9 U	2.3 U
SODIUM	1200 U	1200 U	1500 U	1100 U
THALLIUM	0.19 J	0.19 J	2.9 U	0.18 J
VANADIUM	28 U	39 U	21 U	28 U
ZINC	180	110	160	76 U
CYANIDE	N	N	N	N

ANALYSIS TYPE: METALS, TOTAL

TITLE: UMTHUM TRUCKING

LAB: NANCO

SAMPLE PREP: _____

REVIEW LEVEL: 2

MATRIX: SEDIMENT

METHOD: 9001W71

ANALYST/ENTRY: PLC REVIEWER: PCOV

DATA FILE : P56

UNITS: MG/KG

CASE: 12127

DATE: 07/21/89

SAMPLES	DC943038	DC943039	DC943040	DC943041
ALUMINUM	12000	8500	4300	3400
ANTIMONY	23 J	25 J	12 U	14 J
ARSENIC	6.1 J	5.9 J	3.6 J	3.2 J
BARIUM	100	86	67	68
BERYLLIUM	1.1 J	1.6	0.82 J	0.80 J
CADMIUM	1.1 J	0.53 J	1.0 U	1.0 U
CALCIUM	200000 J	22000 J	310000 J	390000 J
CHROMIUM	18	16	6.8	6.8
COBALT	8.5 J	7.7 J	10 U	1.8 J
COPPER	9.2 U	6.6 U	14 J	14 J
IRON	12000	17000	7900	6900
LEAD	79	9.5	13	8.1
MAGNESIUM	7800	7000	19000	9800
MANGANESE	2000 J	730 J	430 J	420 J
MERCURY	0.18 U	0.13 U	0.10 U	0.10 U
NICKEL	22	19	77	66
POTASSIUM	4400 U	1300 U	1300 U	1000 U
SELENIUM	1.8 U	0.40 J	1.0 U	0.38 J
SILVER	5.5	2.6 U	2.9	4.0
SODIUM	280 J	1300 U	1000 U	1000 U
THALLIUM	2.1 J	2.6 U	0.18 J	2.0 U
VANADIUM	32 U	25 U	210	190
ZINC	120	69 U	43 U	68 U
CYANIDE	N	N	N	N

ANALYSIS TYPE: METALS, TOTAL

TITLE: UMTHUM TRUCKING
 LAB: NANCO
 SAMPLE PREP: _____
 REVIEW LEVEL: 2

MATRIX: SEDIMENT
 METHOD: 9001W71
 ANALYST/ENTRY: PLC
 REVIEWER: DCOX
 DATA FILE : P56

UNITS: MG/KG
 CASE: 12127
 DATE: 07/21/89

SAMPLES	DC943042	DC943043	DC943044
ALUMINUM	6700	4700	10000
ANTIMONY	18 U	16 U	15 J
ARSENIC	4.3 J	3.7 J	5.3 J
BARIUM	79	75	270
BERYLLIUM	1.2 J	1.1 J	1.4
CADMIUM	1.5 U	1.4 U	0.48 J
CALCIUM	160000 J	8000 J	3400 J
CHROMIUM	11	7.9	15
COBALT	3.2 J	6.0 J	11 J
COPPER	7.3 U	6.8 U	6.0 U
IRON	11000	12000	14000
LEAD	9.4	9.4	24
MAGNESIUM	6500	1500	1800
MANGANESE	420 J	420 J	2100 J
MERCURY	0.15 U	0.14 U	0.12 U
NICKEL	13	12	23
POTASSIUM	1500 U	1400 U	2300 U
SELENIUM	0.44 J	0.38 J	0.41 J
SILVER	2.9 U	2.7 U	2.4 U
SODIUM	1500 U	1400 U	1200 U
THALLIUM	2.9 U	2.7 U	0.22 J
VANADIUM	21 U	16 U	27 U
ZINC	63 U	130	110
CYANIDE	N	N	N

6kg